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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/045,118	03/20/98	SUZUKI	K 980268

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EXAMINER

BEREZNY, N

ART UNIT

PAPER NUMBER

2823

DATE MAILED:

12/28/99

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/045,118

Applicant(s)

SUZUKI ET AL.

Examiner

Neal Berezny

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– The MAILING DATE of this communication appears on the cover sheet with the correspondence address –

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

- 1) ☒ Responsive to communication(s) filed on 13 October 1999.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 41 is/are pending in the application.
- 4a) Of the above claim(s) 1-27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 28-41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 March 1998 is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☒ All b) ☐ Some * c) ☐ None of the CERTIFIED copies of the priority documents have been:
1. ☒ received.
2. ☐ received in Application No. (Series Code / Serial Number) _____.
3. ☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

- 14) ☒ Notice of References Cited (PTO-892)
- 15) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 16) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 17) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 18) ☐ Notice of Informal Patent Application (PTO-152)
- 19) ☐ Other: _____.

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DETAILED ACTION

Acknowledgement

1. Examiner acknowledges applicant's election without traverse of invention II, claims 28-41, drawn to a semiconductor device. Claims 1-41 are pending and applicant is reminded to cancel claims 1-27, without prejudice, as being drawn to a non-elected invention.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a) because they fail to show the principle of the present invention, as described in the specification. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Figs. 3-14 are replete with errors, contradictions, and vague, indefinite, and incomplete information. As an example, but by no means a complete list, the following are provided:

- A. Figs. 3 and 4, are labeled with N₂O, but the specification refers to H₂O, see p.15, ln. 16 and 25.
- B. The terms Q and Pm have not been defined or described.
- C. Figs. 9-12 are difference plots but the powers referred to are at different levels and sometimes inconsistent. See also p.16, ln.27 to p.17, ln.19, p.20, ln.15, and p.27, ln.12.

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D. Many of the plot lines are not labeled, and those that are labeled it is not clear which lines that cross and overlap, are continuations of the labeled lines and which are not.

Correction is required.

Specification

3. 35 U.S.C. 112, first paragraph, requires the specification to be written in "full, clear, concise, and exact terms." The specification is replete with terms, which are not clear, concise and exact. The specification should be revised carefully in order to comply with 35 U.S.C. 112, first paragraph. Examples of some unclear, inexact or verbose terms used in the specification are:

- A. P.16, ln.4-5, the ratio of N₂O to H₂O appears to be an error.
- B. P. 15, ln. 27, plasma power of 200C.
- C. P.17, ln.8 and 5, compares fig. 10 with fig.10.
- D. P.17, ln. 14-15, Fig. 13 is a difference of Fig. 10 and 3, but fig. 10 is a difference of fig. 5 and 3.
- E. Please pay particular attention to P. 14 to P. 17, and their relationship to Figs. 3-14.

4. The SUMMARY OF THE INVENTION from pages 4 to 7 is a verbatim copy of the claims. This does not meet the objectives of the summary in 37 CFR 1.73 which states

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that "A brief summary of the invention indicating its nature and substance, which may include a statement of the object of the invention, should precede the detailed description." A further elaboration of this is given in MPEP 608.01(d) which states "Since the purpose of the brief summary of invention is to apprise the public, and more especially those interested in the particular art to which the invention relates, of the nature of the invention, the summary should be directed to the specific invention being claimed. That is, the subject matter of the invention should be described in one or more clear, concise sentences or paragraphs." Claims are written in legal language to specify in broad terms the legal limitations of the invention, and are not intended to provide technical information to the public about the nature of the invention.

5. The first paragraph of 35 U.S.C. 112 states that "The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains". The legal language utilized for claims to set the metes and bounds of the patent protection does not fulfill this requirement. In addition, 37 CFR 1.75 (d) sets up the criteria that the specification is a dictionary for the claims and should provide clear support or antecedent basis for all terms used in the claims. Since the SUMMARY OF THE INVENTION merely duplicates the claims, it is not providing support for the claims.

6. The second paragraph of 35 U.S.C. 112 states that "The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the

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subject matter which the applicant regards as his invention". Since the claims are given at the end of the specification, it is redundant and superfluous to include them as part of the summary.

7. Since rules 37 CFR 1.73 and 37 CFR 1.75 clearly identify the SUMMARY OF THE INVENTION as a section which is separate and distinct from the CLAIMS and the other sections, the intended objective was not to provide an exact copy of the claims in the SUMMARY.

Appropriate correction is required.

8. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 112

9. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

10. Claim 30 is rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. A correlation is made between the refractive index and water content in the first insulator, which is critical or essential to the practice of the invention, but is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). The refractive index is an optical property of the material, and

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since the invention has no direct relationship to optics, the refractive index is merely an observed property of the material. Patents cannot be granted on merely observed phenomena, partially because an observation does not enable one skilled in the art to reproduce the phenomena. Only a deliberate action or activity by one skilled in the art to reproduce the phenomena would constitute enablement. Since the refractive index is a result of the invention and does not cause the invention to occur, the refractive index can not possibly enable one skilled in the art to make the invention.

11. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

12. Claims 32, 33, 36, 37, 40, and 41 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Both the diffusion regions and the gate electrode have "a silicide layer", possibly acting as a source of confusion.

Please distinguish between the two different structures.

13. Claims 31, 35, and 39 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is not clear how the contact region can be between the sidewall oxide and the first oxide, when they overlay each other.

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Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claims 28, 29, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA), further in view of Toyotaka (JP 07135208 A). AAPA forms a semiconductor device with a substrate, fig.1c, el.1, gate electrode, el.3a, diffusion region, el.1A and 1B, sidewall insulator, fig.1d, el.3a and 3b, self-aligned contact hole, fig.1h, el.1c and 1d, first insulator, fig.2, el.6, second insulator, el.4, interlayer insulator, fig.1f, el.5, and contact hole in interlayer insulator and through first and second insulators, fig.1g, el.5a and 5b. Official notice is taken that it is inherent that a conductive pattern is formed in the contact hole to make contact to the devices so that they can be used in an electronic circuit. AAPA does not teach the reduced water content in the first oxide. Toyotaka teaches forming an insulating film with removed H₂O. It would be obvious to one skilled in the art to combine the teachings of Toyotaka with AAPA and remove water from the gate oxide region to reduce the level of interfacial states and increase the device's resistance to the hot electron effect.

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16. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA and Toyotaka as applied to claims 28 above, and further in view of Wolf. Wolf, vol.2, p.196, teaches that the observed refractive index of a good quality oxide is 1.46. Further, Wolf provides the motivation to combine the teachings by pointing out that the observed refractive index is a function of oxygen deficiency in the layer and stated earlier on p.195, table 4.4, property 5, that a good oxide should not absorb or permeate moisture, in order to reduce charge trap densities.

17. Claims 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA and Toyotaka as applied to claim 28 above, and further in view of Oda (JP 6-204420 A). Oda teaches forming silicide contacts in both the source/drain regions and on the gate electrode. It would be obvious to make silicide contacts since that would reduce the contact resistance of the device and improve performance.

18. Claims 34, 35, 38, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA, further in view of Wolf, Vol.2, p.194-198. AAPA forms a semiconductor device with a substrate, fig.1c, el.1, gate electrode, el.3a, diffusion region, el.1A and 1B, sidewall insulator, fig.1d, el.3a and 3b, self-aligned contact hole, fig.1h, el.1c and 1d, first insulator, fig.2, el.6, second insulator, el.4, interlayer insulator, fig.1f, el.5, and contact hole in interlayer insulator and through first and second

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insulators, fig.1g, el.5a and 5b. Official notice is taken that it is inherent that a conductive pattern is formed in the contact hole to make contact to the devices so that they can be used in an electronic circuit. AAPA does not teach the use of B and/or P to act as a gettering agent in order to reduced water content in the first oxide. Wolf, p.196, teaches forming an insulating film with B and P at 3-5 wt% each, in order to act as a gettering agent to remove contaminants, such as H₂O, from sensitive areas. It would be obvious to one skilled in the art to combine the teachings of Wolf with AAPA and use B and P as gettering agents to remove water from the gate oxide region to reduce the level of interfacial states and increase the device's resistance to the hot electron effect.

19. Claims 36, 37, 40, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA and Wolf as applied to claims 34 and 38 above, and further in view of Oda (JP 6-204420 A). Oda teaches forming silicide contacts in both the source/drain regions and on the gate electrode. It would be obvious to make silicide contacts since that would reduce the contact resistance of the device and improve performance.


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CONCLUSION

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Neal Berezny whose telephone number is (703) 305-1481. The examiner can normally be reached on Monday to Friday from 7:00 to 3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy, can be reached at (703) 308-4918. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7724.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.


CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800


12-18-99

Neal Berezny

Patent Examiner

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